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README Document for

Global Land Data Assimilation System Version 2 (GLDAS-2) Products

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Revision History

Revision Date	Changes	Author
05/19/2010	Initial version based on information from Hiroko Beaudoing.	Hualan Rui
06/17/2010	Reviewed and revised	Hiroko Beaudoing
11/21/2011	Updated GES DISC Helpdesk email address	Hualan Rui
10/16/2012	Added information for GLDAS Version 2.0	Hiroko Beaudoing
11/01/2012	Added information for GLDAS Version 2.0	Hualan Rui
11/15/2013	Added information for GLDAS Version 2.0 0.25 degree product	Hiroko Beaudoing
11/18/2014	Added a column into the Table 2 to indicate the forcing parameters.	Hualan Rui
05/12/2015	Added Table 3: DOIs for GLDAS-2 data products	Hualan Rui
06/16/2015	Added GLDAS-2.0 reprocessing related information	Hualan Rui
07/03/2015	Reviewed and revised	Hiroko Beaudoing
07/22/2016	Added GLDAS-2.1 related information	Hiroko Beaudoing
08/01/2016	Added GLDAS-1 and GLDAS-2.1 differences	Hiroko Beaudoing

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Introduction

The goal of the Global Land Data Assimilation System (GLDAS) is to ingest satellite- and ground-based observational data products, using advanced land surface modeling and data assimilation techniques, in order to generate optimal fields of land surface states and fluxes (Rodell et al., 2004). GLDAS drives multiple, offline (not coupled to the atmosphere) land surface models, integrates a huge quantity of observation based data, and executes globally at high resolutions (2.5° to 1 km), enabled by the Land Information System (LIS) (Kumar et al., 2006). Currently, GLDAS drives four land surface models (LSMs): Catchment, Noah, the Community Land Model (CLM), and the Variable Infiltration Capacity (VIC). More information is available at the Land Data Assimilation Systems (LDAS) and Land Information System (LIS) websites. This document specifically describes the data products of Version 2 of the Global Land Data Assimilation System (hereafter, GLDAS-2).

Basic characteristics of the GLDAS-2 data

GLDAS-2 has two components: one forced entirely with the Princeton meteorological forcing data (hereafter, GLDAS-2.0), and the other forced with a combination of model and observation based forcing datasets (hereafter, GLDAS-2.1). GLDAS-2.0 currently extends from 1948 through 2010 and will be extended to recent years as the dataset becomes available. GLDAS-2.1 extends from 2000 to present with about 1 month latency and will be updated monthly. Other LSMs simulation outputs will be added to GLDAS-2.1 as they become available. GLDAS-2.1 is a replacement for GLDAS-1 product stream.

The temporal resolution for the GLDAS-2 products is 3-hourly. Monthly products are generated through temporal averaging of the 3-hourly products. Table 1 lists some basic characteristics of the GLDAS-2 data. Please check the release news at the GES DISC Hydrology Portal for the current data release status.

Table 1. Basic characteristics of the GLDAS-2 data.

Contents	Outputs from NOAH Land surface model
Format	NetCDF
Latitude extent	-60° to 90°
Longitude extent	-180° to 180°
Spatial resolution	1.0°, 0.25°
Temporal resolution	3-hourly and monthly
Temporal coverage	GLDAS-2.0: 3Z January 1, 1948 – 21Z December 31, 2010
	GLDAS-2.1: 0Z January 1, 2000 - present for the 1.0° data 0Z February 24, 2000 - present for the 0.25°data (TBD)
Dimension	360 (lon) x 150 (lat) for the 1.0° data 1440 (lon) x 600 (lat) for the 0.25° data
Origin (1st grid center)	(179.5W, 59.5S) for the 1.0° data (179.875W, 59.875S) for the 0.25° data
Land surface models	NOAH 3.3

Global Land Data Assimilation System Version 2 (GLDAS-2) Products README

The GLDAS-2.0 model simulation was initialized on simulation date January 1, 1948, using soil moisture and other state fields from the LSM climatology for that day of the year. The simulation was forced by the global meteorological forcing data set from Princeton University (Sheffield et al., 2006). The simulation uses the common GLDAS data sets for land water mask (MOD44W: Carroll et al., 2009) and elevation (GTOPO30) along with the Noah model default land cover (Modified IGBP MODIS 20-category vegetation) and the soil texture (Hybrid STATSGO/FAO) datasets. The MODIS based land surface parameters are used in the current GLDAS-2.0 and GLDAS-2.1 products while the AVHRR base parameters were used in GLDAS-1 and previous GLDAS-2 products (prior to October 2012).

The GLDAS-2.1 simulation started on January 1, 2000 using the conditions from the GLDAS-2.0 simulation. This simulation was forced with National Oceanic and Atmospheric Administration (NOAA)/Global Data Assimilation System (GDAS) atmospheric analysis fields (Derber et al., 1991), the disaggregated Global Precipitation Climatology Project (GPCP) precipitation fields (Adler et al., 2003), and the Air Force Weather Agency's AGRicultural METeorological modeling system (AGRMET) radiation fields which became available for March 1, 2001 onwards.

What are the differences between GLDAS-1 and GLDAS-2?

GLDAS-1 forcing data sources were switched several times, over the record from 1979 to present, which introduced unnatural trends and resulted in highly uncertain forcing fields in 1995-1997. More information about the GLDAS-1 forcing data is available at http://ldas.gsfc.nasa.gov/gldas/GLDASforcing.php.

GLDAS-2 has two components, GLDAS-2.0 and GLDAS-2.1. The main objective for GLDAS-2.0 is to create more climatologically consistent data sets, using the "Global Meteorological Forcing Dataset" from Princeton University, currently extending from 1948 - 2010. GLDAS-2.1 is analogous to GLDAS-1 product stream, with upgraded models forced by a combination of GDAS, disaggregated GPCP, and AGRMET radiation data sets.

Other enhancements made in GLDAS-2 include model version upgrade, switching to MODIS-based land surface parameter data sets, and initialization of soil moisture over desert. In the Noah model, the bottom layer temperature was also updated. More details regarding the land surface parameter data changes are available at http://ldas.gsfc.nasa.gov/gldas/.

What is new about the reprocessed GLDAS-2.0?

The GLDAS-2.0 data have been reprocessed with updated Princeton Forcing Data and upgraded Land Information System (LIS) software. The reprocessed GLDAS-2.0 data are archived in NetCDF-4 format. Additional model output fields are included (see Table 2). Streamlining the output format resulted in changing some of the units from the GLDAS2.0 data prior to July 2015. The land surface characteristics (i.e. land cover, soil texture) over

some grid cells were modified due to a bug fix. Details of the changes and the new land surface parameter datasets are available at http://ldas.gsfc.nasa.gov/gldas/.

What are the differences between GLDAS-1 and GLDAS-2.1?

The main objective of GLDAS-2.1 is to provide up-to-date global land surface model outputs, using observation based forcing, while preserving consistency of the long term climatology (i.e. GLDAS-2.0) to the extent possible. Two major issues were found in the GLDAS-1 forcing fields. First, the AGRMET shortwave downward flux displayed sharp, unnatural gradient lines in the Northern Hemisphere in certain years. Second, there was a dramatic change in precipitation in certain locations starting in 2009. Furthermore, comparisons of GLDAS-1 radiation and precipitation fields revealed that GLDAS-1 had high bias relative to the well-validated Surface Radiation Budget (SRB) dataset (Stackhouse et al., 2011) and GLDAS-1 precipitation (i.e. CMAP) had low bias relative to the Global Precipitation Climatology Project (GPCP) dataset. Similar biases were observed compared to GLDAS-2.0 (i.e. Princeton forcing) whose radiation fields were bias corrected to the SRB dataset and precipitation fields were disaggregated using the GPCP and Tropical Rainfall Measuring Mission (TRMM) datasets.

GLDAS-2.1 addressed these issues as follows. The AGRMET radiation flux fields are bias corrected using the period of overlap between AGRMET and SRB (2002-2007) to compute monthly, gridded scale factors that are applied for the overlapping period of AGRMET data. Similarly, GDAS radiation fields were bias corrected to SRB for the period of 2000-2001/02. Because AGRMET displayed high bias compared to SRB, the fluxes for 2008 onwards are adjusted by applying another set of gridded scale factors that are computed from annual mean climatology of 2002-2007, thus avoiding a discontinuity in the GLDAS-2.1 data. The bias-corrected AGRMET forcing data should be consistent with the climatology of SRB, however, due to the short overlapping period, the scaling approach is unable to correct an apparent shift (of unknown origin) in the AGRMET climatology after 2011. For the precipitation fields, we use the GPCP 1-degre Daily (1DD) v1.2 dataset (Huffman et al., 2001) and an updated disaggregation routine (making use of GDAS precipitation fields) to prepare 3-hourly GPCP fields. However, the GPCP 1DD data is not updated regularly and currently ends in October, 2015. Consequently, at the time of writing the GDAS was used for November, 2015 onwards in order to run GLDAS-2.1 up to present. Once the GPCP data is updated, GLDAS-2.1 will be reprocessed for the recent months.

Updates

Please periodically check the GES DISC web site and GES DISC Hydrology Portal for the latest GLDAS-2 data.

Acknowledgment

Please refer to Rodell et al. (2004) for more information about the GLDAS project.

NASA requests that you include the following acknowledgment in papers published using

these data:

"*The data used in this study were acquired as part of the mission of NASA's Earth Science Division and archived and distributed by the Goddard Earth Sciences (GES) Data and Information Services Center (DISC).*"

We would appreciate receiving a copy of your publication, which can be forwarded to the following address:

> GES DISC Help Desk
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> NASA/Goddard Space Flight Center
> Greenbelt, MD 20771
>
> Phone: 301-614-5224
> Fax: 301-614-5268
> **Email:** gsfc-help-disc@lists.nasa.gov

Data Organization

File Naming Convention

GLDAS-2 data are named in accordance with the following convention:

GLDAS_<Model><Grid spacing>_<Temporal spacing>_.A<Date>.<Product version>.nc4

Attribute	Description
<Model>	"NOAH" for the Noah Model "Catchment" for the Catchment Model "CLM" for the Common Land Model "VIC" for the Variable Infiltration Capacity Model
<Grid spacing>	"025" for 1/4th degree "10" for 1 degree
<Temporal spacing>	"3H" for 3-hourly datasets
	"M" for monthly datasets
<Date> *	<YYYYMMDD>.<HHHH> for 3-hourly datasets <YYYYMM> for monthly datasets
<Product version>	"020" for GLDAS-2.0 "021" for GLDAS-2.1

* (4-digit year; 2-digit month; 2-digit day of month; 4-digit GMT hour of day)

For examples, file name for 3-hourly 1.0 degree GLDAS-2.0 Noah data at 00:03Z on 1 January 1948 is "GLDAS_NOAH10_3H.A1948001.0300.020.nc4," and file name for monthly 1-degree GLDAS-2.0 Noah data for January 1948 is "GLDAS_NOAH10_M_A194801.020.nc4."

File Format Structure

The GLDAS-2 data are archived in NetCDF format. NetCDF is a set of software libraries and self-describing, machine-independent data formats that support the creation, access, and sharing of array-oriented scientific data [see more].

Data Contents

Noah Model Data

GLDAS-2 Noah model data contains thirty-six fields. Table 2 lists variables provided in the GLDAS-2 Noah model data.

Table 2. Parameters in the GLDAS-2 Noah model data

Short Name	Description	Unit
Swnet_tavg	Net short wave radiation flux	W m-2
Lwnet_tavg	Net long-wave radiation flux	W m-2
Qle_tavg	Latent heat net flux	W m-2
Qh_tavg	Sensible heat net flux	W m-2
Qg_tavg	Heat flux	W m-2
Snowf_tavg	Snow precipitation rate	kg m-2 s-1
Rainf_tavg	Rain precipitation rate	kg m-2 s-1
Evap_tavg	Evapotranspiration	kg m-2 s-1
Qs_acc	Storm surface runoff	kg m-2
Qsb_acc	Baseflow-groundwater runoff	kg m-2
Qsm_acc	Snow melt	kg m-2
AvgSurfT_inst	Average Surface Skin temperature	K
Albedo_inst	Albedo	%
SWE_inst	Snow depth water equivalent	kg m-2
SnowDepth_inst	Snow depth	m
SoilMoi0_10cm_inst	Soil moisture	kg m-2
SoilMoi10_40cm_inst	Soil moisture	kg m-2
SoilMoi40_100cm_inst	Soil moisture	kg m-2
SoilMoi100_200cm_inst	Soil moisture	kg m-2
SoilTMP0_10cm_inst	Soil temperature	K
SoilTMP10_40cm_inst	Soil temperature	K

SoilTMP40_100cm_inst	Soil temperature	K
SoilTMP100_200cm_inst	Soil temperature	K
PotEvap_tavg	Potential evaporation rate	W m-2
ECanop_tavg	Canopy water evaporation	W m-2
Tveg_tavg	Transpiration	W m-2
ESoil_tavg	Direct Evaporation from Bare Soil	W m-2
RootMoist_inst	Root zone soil moisture	kg m-2
CanopInt_inst	Plant canopy surface water	kg m-2
Wind_f_inst	Wind speed	m/s
Rainf_f_tavg	Total precipitation rate	kg m-2 s-1
Tair_f_inst	Temperature	K
Qair_f_inst	Specific humidity	kg/kg
Psurf_f_inst	Pressure	Pa
SWdown_f_tavg	Downward short-wave radiation flux	W m-2
LWdown_f_tavg	Downward long-wave radiation flux	W m-2

The short names with extension "_tavg" are past 3-hr averaged variables.

The short names with extension "_acc" are past 3-hr accumulated variables.
The short names with extension "_inst" are instantaneous variables.
The short names with "_f" are forcing variables.

Data Interpretation

1. Due to unreliable Greenland forcing data and the lack of a glacier/ice sheet model, snow water equivalent accumulates indefinitely in Greenland and a few other Arctic points. Therefore it is highly recommended that Greenland and other points with abnormally large snow water equivalent values be masked out when performing global analyses.
2. Total precipitation is the sum of rain and snow precipitation rates. The forcing "Rainf_f_tavg" variable is the sum.
3. Total runoff is the sum of subsurface runoff and surface runoff.
4. Terrestrial water storage is the sum of soil moisture in all layers, accumulated snow, and plant canopy surface water.
5. Use temporal averaging, not accumulation, to upscale the data to different temporal resolutions. For example, rainfall and snowfall are provided as rates, i.e., kg/m2/s. So the correct method of upscaling is averaging, which does not change the units.
6. Monthly average files contain straight averages of 3-hourly data, so that each monthly average has units PER 3 HOURS. For example, total evapotranspiration (evap) for April 1979 is the average 3-hour mean rate of evapotranspiration over all the 3-hour intervals in April 1979. It is NOT the accumulated evapotranspiration in April 1979. To compute the latter, use this formula:

   total_evapt (April) = evapsfc (April) * 10800 {sec/3hr} * 8{3hr/day}* 30{days}

   This would be irrelevant, and the above formula should not be used, if the field

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of interest were a state (e.g., soil moisture).

7. Heights of forcing fields depend on the data sets used to drive the simulation. Presently, all the GLDAS data sets use the 2 m temperature and specific humidity and the 10 m wind for the entire time span.

8. The number of vertical levels for Soil Temperature and Soil Moisture is model specific. NOAH has total of 4 layers thickness: 0-10, 10-40, 40- 100, and 100-200 cm.

9. The mean fields in monthly data (e.g. evapotranspiration, see Table 2) contain straight average over 3z on the 1st day of month to 0z on the 1st day of next month. Similarly, the accumulated fields (e.g. runoff) contain straight average of 3-hour accumulation from 3z on the 1st to 0z on the first day of next month. The instantaneous fields are averaged over 0z on the 1st day of month to 21z on the last day of month.

Reading the Data

The GLDAS-2 data are archived in self-describing and machine-independent NetCDF format. The Unidata page, http://www.unidata.ucar.edu/software/netcdf/software.html, provides a list of software for manipulating or displaying NetCDF Data.

Reading/viewing the data by Panoply

Panoply, http://www.giss.nasa.gov/tools/panoply/, is a cross-platform application that plots geo-referenced and other arrays from NetCDF, HDF, GRIB, and other data sets.

The Data Cookbook of NASA GES DISC provides a recipe for Quick View Data with Panoply.

Reading/viewing the data by GrADS

The Grid Analysis and Display System (GrADS) is an interactive desktop tool for easy access, manipulation, and visualization of earth science data. GrADS supports several data formats, such as binary, NetCDF, HDF, and GRIB. The documentation and software for GrADS can be found at: http://grads.iges.org/grads/

Each individual GLDAS-2 NetCDF file can be opened by GrADS sdfopen directly without a data descriptor file (aka ctl file). After calling sdfopen, GrADS commands, such as "q file", "d [variable_name]", etc. can be used to query file information, read and display the data. Below is an example showing how to sdfopen a GLDAS-2 NetCDF file and query for the dimensions and variables of the file.

```
ga-> xdfopen GLDAS_NOAH10_M.2.0.xdf
Scanning Descriptor File:  GLDAS_NOAH10_M.2.0.xdf
SDF file
/ftp/data/s4pa/GLDAS/GLDAS_NOAH10_M.2.0/%y4/GLDAS_NOAH10_M.A%y4%m2.020.nc4
is open as file 1
LON set to 0 360
LAT set to -59.5 89.5
```

```
LEV set to 0 0
Time values set: 1948:1:1:0 1948:1:1:0
E set to 1 1
ga-> q file
File 1 : GLDAS2.0 LIS land surface model output monthly mean
  Descriptor: GLDAS_NOAH10_M.2.0.XDF
  Binary:  GLDAS_NOAH10_M.2.0/%y4/GLDAS_NOAH10_M.A%y4%m2.020.nc4
  Type = Gridded
  Xsize = 360  Ysize = 150  Zsize = 1  Tsize = 780  Esize = 1
  Number of Variables = 36
    swnet_tavg  0  t,y,x  Net short wave radiation flux
    lwnet_tavg  0  t,y,x  Net long-wave radiation flux
    qle_tavg  0  t,y,x  Latent heat net flux
    qh_tavg  0  t,y,x  Sensible heat net flux
    qg_tavg  0  t,y,x  Heat flux
    snowf_tavg  0  t,y,x  Snow precipitation rate
    rainf_tavg  0  t,y,x  Rain precipitation rate
    evap_tavg  0  t,y,x  Evapotranspiration
    qs_acc  0  t,y,x  Storm surface runoff
    qsb_acc  0  t,y,x  Baseflow-groundwater runoff
    qsm_acc  0  t,y,x  Snow melt
    avgsurft_inst  0  t,y,x  Average Surface Skin temperature
    albedo_inst  0  t,y,x  Albedo
    swe_inst  0  t,y,x  Snow depth water equivalent
    snowdepth_inst  0  t,y,x  Snow depth
    soilmoi0_10cm_i  0  t,y,x  Soil moisture
    soilmoi10_40cm_  0  t,y,x  Soil moisture
    soilmoi40_100cm  0  t,y,x  Soil moisture
    soilmoi100_200c  0  t,y,x  Soil moisture
    soiltmp0_10cm_i  0  t,y,x  Soil temperature
    soiltmp10_40cm_  0  t,y,x  Soil temperature
    soiltmp40_100cm  0  t,y,x  Soil temperature
    soiltmp100_200c  0  t,y,x  Soil temperature
    potevap_tavg  0  t,y,x  Potential evaporation rate
    ecanop_tavg  0  t,y,x  Canopy water evaporation
    tveg_tavg  0  t,y,x  Transpiration
    esoil_tavg  0  t,y,x  Direct Evaporation from Bare Soil
    rootmoist_inst  0  t,y,x  Root zone soil moisture
    canopint_inst  0  t,y,x  Plant canopy surface water
    wind_f_inst  0  t,y,x  Wind speed
    rainf_f_tavg  0  t,y,x  Total precipitation rate
    tair_f_inst  0  t,y,x  Temperature
    qair_f_inst  0  t,y,x  Specific humidity
    psurf_f_inst  0  t,y,x  Pressure
    swdown_f_tavg  0  t,y,x  Downward short-wave radiation flux
    lwdown_f_tavg  0  t,y,x  Downward long-wave radiation flux
 ga->
```

With a GrADS descriptor file, by using GrADS command xdfopen, multiple GLDAS-2

NetCDF files can be opened, therefore, time aggregation related visualization and data analysis can be done by GrADS. Below is a GrADS sample descriptor file for 3-hourly 1.0x1.0 degree Noah data product GLDAS_NOAH10_3H.2.0.

GLDAS_NOAH10_M.2.0.xdf, a sample data descriptor file

```
DSET ./GLDAS_NOAH10_M.2.0/%y4/GLDAS_NOAH10_M.A%y4%m2.020.nc4
OPTIONS template
TDEF time  780  LINEAR  jan1948   1mo
*** variable name may not appear completely (max 15 characters)
```

An example for using xdfopen to open GLDAS_NOAH10_3H.2.0.xdf

```
ga-> xdfopen GLDAS_NOAH10_M.2.0.xdf
Scanning Descriptor File:  GLDAS_NOAH10_M.2.0.xdf
SDF file
/ftp/data/s4pa/GLDAS/GLDAS_NOAH10_M.2.0/%y4/GLDAS_NOAH10_M.A%y4%m2.020.nc4
is open as file 1
LON set to 0 360
LAT set to -59.5 89.5
LEV set to 0 0
Time values set: 1948:1:1:0 1948:1:1:0
E set to 1 1
ga-> q file
File 1 : GLDAS2.0 LIS land surface model output monthly mean
 Descriptor: GLDAS_NOAH10_M.2.0.XDF
 Binary:  GLDAS_NOAH10_M.2.0/%y4/GLDAS_NOAH10_M.A%y4%m2.020.nc4
 Type = Gridded
 Xsize = 360  Ysize = 150  Zsize = 1  Tsize = 780  Esize = 1
 Number of Variables = 36
   swnet_tavg  0  t,y,x  Net short wave radiation flux
   lwnet_tavg  0  t,y,x  Net long-wave radiation flux
   qle_tavg  0  t,y,x  Latent heat net flux
   qh_tavg  0  t,y,x  Sensible heat net flux
   qg_tavg  0  t,y,x  Heat flux
   snowf_tavg  0  t,y,x  Snow precipitation rate
   rainf_tavg  0  t,y,x  Rain precipitation rate
   evap_tavg  0  t,y,x  Evapotranspiration
   qs_acc  0  t,y,x  Storm surface runoff
   qsb_acc  0  t,y,x  Baseflow-groundwater runoff
   qsm_acc  0  t,y,x  Snow melt
   avgsurft_inst  0  t,y,x  Average Surface Skin temperature
   albedo_inst  0  t,y,x  Albedo
   swe_inst  0  t,y,x  Snow depth water equivalent
   snowdepth_inst  0  t,y,x  Snow depth
   soilmoi0_10cm_i  0  t,y,x  Soil moisture
   soilmoi10_40cm_  0  t,y,x  Soil moisture
```

```
    soilmoi40_100cm  0  t,y,x  Soil moisture
    soilmoi100_200c  0  t,y,x  Soil moisture
    soiltmp0_10cm_i  0  t,y,x  Soil temperature
    soiltmp10_40cm_  0  t,y,x  Soil temperature
    soiltmp40_100cm  0  t,y,x  Soil temperature
    soiltmp100_200c  0  t,y,x  Soil temperature
    potevap_tavg  0  t,y,x  Potential evaporation rate
    ecanop_tavg  0  t,y,x  Canopy water evaporation
    tveg_tavg  0  t,y,x  Transpiration
    esoil_tavg  0  t,y,x  Direct Evaporation from Bare Soil
    rootmoist_inst  0  t,y,x  Root zone soil moisture
    canopint_inst  0  t,y,x  Plant canopy surface water
    wind_f_inst  0  t,y,x  Wind speed
    rainf_f_tavg  0  t,y,x  Total precipitation rate
    tair_f_inst  0  t,y,x  Temperature
    qair_f_inst  0  t,y,x  Specific humidity
    psurf_f_inst  0  t,y,x  Pressure
    swdown_f_tavg  0  t,y,x  Downward short-wave radiation flux
    lwdown_f_tavg  0  t,y,x  Downward long-wave radiation flux
 ga->
```

Data Access

The NASA GES DISC maintains archives of all GLDAS data products and many other Hydrology data sets. The archived data can be accessed via HTTP network transfer. GLDAS data can be accessed via the GES DISC Unified User Interface (UUI) at http://disc.sci.gsfc.nasa.gov/uui/#/search/GLDAS.

Data Volume

Model	Resolution	3-Hourly		Monthly	
		Files/day	**Vol/Year**	**Files/year**	**Vol/Year**
Noah	1.0° × 1.0°	8	2.6 GB	12	9.6 MB
Noah	0.25° × 0.25°	8	45 GB	12	190 MB
Catchment	1.0° × 1.0°	8			
CLM	1.0° × 1.0°	8			
VIC	1.0° × 1.0°	8			

The table will be updated as data volume information for other models become available.

Search and download data via Mirador

GLDAS data can be searched through a keyword (e.g., Noah) and the time span, and downloaded in a batch mode via Mirador, http://mirador.gsfc.nasa.gov/.

OPeNDAP Access

The GLDAS data can be accessed via OPeNDAP:

http://hydro1.gesdisc.eosdis.nasa.gov/opendap/GLDAS
/.

HTTP Access

The GLDAS data can be downloaded directly via the GES DISC HTTP server: http://hydro1.gesdisc.eosdis.nasa.gov/data/GLDAS/.

Points of Contact

For information about or assistance in using any GES DISC data, please contact the GES DISC Help Desk at:

> GES DISC
> Code 610.2
> NASA Goddard Space Flight Center
> Greenbelt, Maryland 20771
> Email: gsfc-help-disc@lists.nasa.gov
> 301-614-5224 (voice)
> 301-614-5268 (fax)

For general science questions and comments, please contact:

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DOIs for GLDAS Version 2 Data Products

A Digital Object Identifier or DOI is a unique alphanumeric string used to identify a digital object and provide a permanent link online. DOIs are often used in online publications in citations. The table 3 list DOIs for GLDAS-2 data products.

Table 3. DOIs for GLDAS-2 Data Products

Short Name	Product Description	DOI
GLDAS_NOAH025_3H_2.0	GLDAS Noah Land Surface Model L4 3 hourly 0.25 x 0.25 degree, Version 2.0	
GLDAS_NOAH025_M_2.0	GLDAS Noah Land Surface Model L4 monthly 0.25 x 0.25 degree, Version 2.0	
GLDAS_NOAH10_3H_2.0	GLDAS Noah Land Surface Model L4 3 hourly 1.0 x 1.0 degree, Version 2.0	
GLDAS_NOAH10_M_2.0	GLDAS Noah Land Surface Model L4 monthly 1.0 x 1.0 degree, Version 2.0	
GLDAS_NOAH025_3H_2.1	GLDAS Noah Land Surface Model L4 3 hourly 0.25 x 0.25 degree, Version 2.1	
GLDAS_NOAH025_M_2.1	GLDAS Noah Land Surface Model L4 monthly 0.25 x 0.25 degree, Version 2.1	
GLDAS_NOAH10_3H_2.1	GLDAS Noah Land Surface Model L4 3 hourly 1.0 x 1.0 degree, Version 2.1	
GLDAS_NOAH10_M_2.1	GLDAS Noah Land Surface Model L4 monthly 1.0 x 1.0 degree, Version 2.1	

Each of DOIs in the Table 3 is linked to the corresponding data product page and Data Citation for the data product is on top of the page. If you use these data in your research or applications please include a reference in your publication(s) similar to the following example:

Matthew Rodell and Hiroko Kato Beaudoing, NASA/GSFC/HSL (12.01.2013),*GLDAS Noah Land Surface Model L4 3 hourly 0.25 x 0.25 degree Version 2.0, version 020*, Greenbelt, Maryland, USA: Goddard Earth Sciences Data and Information Services Center (GES DISC), Accessed **Enter User Data Access Date** at doi:10.5067/342OHQM9AK6Q

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Appendices

A. Acronyms

The following acronyms and abbreviations are used in this document.

AGRMET	AGRicultural METeorological Modeling System
CAPE	Convective Available Potential Energy
CMAP	CPC Merged Analysis of Precipitation
CMORPH	CPC precipitation MORPHing technique
CPC	NCEP's Climate Prediction Center
CPPA	Climate Prediction Program for the Americas
EMC	NCEP's Environmental Modeling Center
GDAS	Global Data Assimilation System
GDS	GrADS Data Server
GES DISC	Goddard Earth Sciences Data and Information Services Center
Giovanni	GES-DISC Interactive On-line Visualization and Analysis Infrastructure
GLDAS	Global Land Data Assimilation System
GrADS	Grid Analysis and Display System
GPCP	Global Precipitation Climatology Project
GRIB	GRIdded Binary
HDF	Hierarchical Data Format
HDISC	Hydrology Data and Information Services Center
LDAS	Land Data Assimilation System
LIS	Land Information System

LSM	Land Surface Model
Mirador	Fast interface for searching Earth science data at NASA GES DISC
NARR	North American Regional Reanalysis
NASA	National Aeronautics and Space Administration
NCEP	National Centers for Environmental Prediction
netCDF	network Common Data Form
NIDIS	National Drought Integrated Information System
NLDAS	North America Land Data Assimilation System
NOAA	National Oceanic and Atmospheric Administration
OHD	NOAA's Office of Hydrologic Development
PRISM	Parameter-Elevation Regressions on Independent Slopes Model
SAC	Sacramento model
SRB	Surface Radiation Budget
SVAT	Soil Vegetation Atmosphere Transfer model
VIC	Variable Infiltration Capacity macroscale model
WSR-88D	Weather Service Radar-Doppler